

26  
5

JPRS: 3402

15 June 1960

SELECTED MILITARY TRANSLATIONS ON EASTERN EUROPE

RETURN TO MAIN FILE

19990503 100

Photocopies of this report may be purchased from:

PHOTODUPLICATION SERVICE  
LIBRARY OF CONGRESS  
WASHINGTON 25, D. C.

**DISTRIBUTION STATEMENT A**

Approved for public release;  
Distribution Unlimited

U. S. JOINT PUBLICATIONS RESEARCH SERVICE  
205 EAST 42nd STREET, SUITE 300  
NEW YORK 17, N. Y.

## F O R E W O R D

This publication was prepared under contract by the UNITED STATES JOINT PUBLICATIONS RESEARCH SERVICE, a federal government organization established to service the translation and research needs of the various government departments.

JPRS: #3402

CSO: 3735-D

SELECTED MILITARY TRANSLATIONS ON EASTERN EUROPE

Table of Contents	<u>Page</u>
1. Decree of the Transfer of Matters From the Authority of Military Sectors to the Administrative Agencies of Municipality People's Councils Authorized for National Defense Matters	1
2. Decree on Amendments and Supplements to the Decree on the Organization of Councils, Commissions, and Republic and Local National Defense Administrative Agencies	8
3. The Soviet T-54 Tank	11
4. Concerning Training Methods and Experiences in the Use of Visual Training Aids	15
5. Possible Uses of the VOJIN Service in Coastal Defense	21
6. Defense of VOJIN Units	26
7. The Mobile Encampment	35

JPRS: 3402

CSO: 3735-D

SELECTED MILITARY TRANSLATIONS ON EASTERN EUROPE

DECREE ON THE TRANSFER OF MATTERS FROM THE AUTHORITY OF MILITARY SECTORS  
TO THE ADMINISTRATIVE AGENCIES OF MUNICIPALITY PEOPLE'S COUNCILS

AUTHORIZED FOR NATIONAL DEFENSE MATTERS

Sluzbeni list FNRJ [Federativna narodna republika Jugoslavije - Federal  
People's Republic of Yugoslavia]  
[Official Gazette FNRJ],  
No 8, 24 February 1960, Belgrade,  
Pages 206-208

On the basis of Article 121 of the General Law on the Regulation of Municipalities and Srezes (Sluzbeni list FNRJ, No 26, 1955; No 29, 1957; and No 24, 1959), the Federal Executive Council issues the Decree on the Transfer of Matters from the Authority of Military Sectors to the Administrative Agencies of Municipality People's Councils Authorized for National Defense Matters.

Article 1

By this decree matters which heretofore have been within the jurisdiction of the military sectors are transferred to the jurisdiction of the organs of administration of the municipality people's councils competent for national defense matters.

1. The Law on National Defense (Sluzbeni list FNRJ, No 30, 1955).

Article 2

The organ of administration of the municipality people's council competent for matters of national defense performs these tasks:

1. Keeps records of persons who are subject to draft (article 60, paragraph 1),
2. Issues a general call for recruitment (article 61, paragraph 1),
3. Inducts and discharges persons obligated for military service (article 84, paragraph 1),
4. Makes decisions in connection with recruitment and performance of military service with respect to the completion of military service



in the reserve component of the Yugoslav People's Army with the exception of military (and naval) personnel for whom a decision is made in connection with the performance of military service by the organ specified by the state secretary for matters of national defense (article 89, paragraph 1),

5. Makes decisions regarding the exemption from pre-military training because of illness of comparatively long duration (article 95),

6. Inventories cavalry, draft, and pack animals suited for work together with cavalry, draft, and pack equipment as well as transport and construction means with spare parts for the purpose of their use for national defense needs (article 119, paragraph 1),

7. Establishes commissions for the surveying of animals, equipment, and transport and construction means within the area of the municipality in which are included also military personnel assigned by the competent military-territorial organ (article 120, paragraph 2),

8. Issues to the owners of stock military stock deeds for the stock which may be used for national defense needs (article 120, paragraph 1),

9. Determines the time and place for the transfer of listed stock, equipment, and transport and construction means to the military organs (article 123, paragraph 1),

Failure to report to the organ of administration of the municipality people's council competent for matters of national defense in the sense of article 146, points 1, 3, and 4 of the Law on National Defense will be punished as an infraction according to that regulation.

Failure to notify the organ of administration of the municipality people's council competent for matters of national defense in the sense of article 148 of the Law on National Defense will be punished as an infringement according to that regulation.

II. The Law on the Yugoslav People's Army (Sluzbeni list FNRJ, No 29, 1955).

### Article 3

The organ of administration of the municipality people's council competent for matters of national defense performs these tasks:

1. Keeps records of persons obligated for military service (article 15, paragraph 1, point 1),

2. Calls and inducts draftees for service in the Yugoslav People's Army (article 15, paragraph 1, point 3),

3. Performs mobilization tasks in accordance with special regulations (article 15, paragraph 1, point 4),

4. Keeps records concerning cavalry, draft, and pack animals together with equipment, transport and construction means together with spare parts, and tools listed for the needs of the Yugoslav People's Army (article 15, paragraph 1, point 6).

III. The Regulation Governing Performance of Military Obligations (Sluzbeni list FNRJ, No 23, 1957).

#### Article 4

The organ of administration of the municipality people's council competent for matters of national defense performs these tasks:

1. Keeps records concerning persons who are subject to the military obligation (article 6),
2. Calls persons who are subject to military service for the purpose of performing this obligation (articles 7 and 46),
3. Calls for a recruitment examination draftees for whom it has been previously determined in an examination that they were temporarily unsuited for military service until they had reached their 27th birthday (article 10, paragraph 1),
4. Registers changes in accordance with the induction of recruits and persons subject to military service and conducts an induction-discharge service for recruits and others subject to military service (article 11, 30, and 49, paragraph 3),
5. Inducts recruits for the performance of the period of military service (article 12, paragraph 1 and article 14, paragraph 1),
6. Submits reports to the competent military prosecutor against persons obligated for recruitment who have not been inducted into military service by their 27th birthday because they have evaded the military obligation (article 14, paragraph 2),
7. Inducts into military service recruits who appear voluntarily before they have been called (article 15, paragraph 1),
8. Makes decisions concerning the requests of persons obligated for military service and military (and naval) personnel who wish to be considered as the sole support or the only son in connection with the determination of the length of their military service (articles 17, 18, 41, points 1 and 2, and article 44),
9. Makes decisions concerning the requests of persons obligated for military service for the postponement of their service (articles 19 and 41, point 3),
10. Inducts for the completion of the period of military service persons obligated for military service who because of temporary incapacity for such service interrupted the period of military service if after another examination they are evaluated as being capable of military service (article 24, paragraph 2),
11. Issues summons for periodic re-examinations when these examinations are ordered by the State Secretariat for Matters of National Defense and inducts for the completion of the period of military service persons who, upon re-examination, are evaluated as being capable or as having a limited capability for military service or registers them in the records as persons obligated for military service (article 26, paragraphs 1 and 2),
12. Issues permits for a temporary visit abroad to draftees and persons obligated for military service if the visit abroad lasts up to 6 months (article 27),

13. Enters additional information in the personal military record in addition to information concerning service in the regular component of the Yugoslav People's Army (article 33),

14. Takes personal military records and at the same time issues receipts to their owners (article 36, paragraph 1),

15. Takes the personal military records of persons obligated for military service who lose their Yugoslav citizenship and issues to these persons certificates concerning the completion of military service or concerning the regulation of their military obligation in another way (article 36, paragraph 2),

16. Calls persons obligated for military service into military service upon the request of the military organs (article 37, paragraph 1),

17. Makes decisions concerning the requests of persons obligated for military service for the postponement of military training except in cases covered by article 38, paragraph 1, point 5 of the Regulation for Governing the Performance of the Military Obligation (article 38, paragraph 1, points 1-4; article 39, paragraphs 2 and 3; article 41, point 4; and article 43, paragraph 2),

18. Keeps records concerning the wives of persons obligated for military service (article 40),

19. Makes decisions concerning requests of draftees for recognition as being the sole support and concerning requests for postponement of the period of military service (article 42),

20. Issues certificates concerning the time spent in military training or in the performance of other tasks in connection with the military obligation and supplies these certificates to the organs, institutions, or organizations in which these persons have been employed (article 47, paragraphs 1 and 3),

21. Issues certificates for recruits who have left their jobs and entered military service and supplies these certificates to the organs, institutions, or organizations in which they have been employed (article 48, paragraph 1).

IV. The Regulation Concerning the Health Protection of Persons Who Because of Injury or Illness Have Been Discharged from the Yugoslav People's Army (Sluzbeni list FNRJ, No 24, 1957).

#### Article 5

The organ of administration of the municipality people's council competent for matters of national defense conducts the process and makes decisions concerning the right to health protection of persons who because of injury or illness have been discharged from the Yugoslav People's Army (articles 2, 3, 5, paragraph 3; articles 6, 7, paragraphs 1 and 3; and article 15, paragraph 3).

V. The Instruction Governing the Implementation of the Provisions of the Law on Working Relations for the Compensation to Workers for the Time Absent from Work Because of Induction for the Performance or the Completion of the Period of Military Service (Sluzbeni list FNRJ, No 38, 1958).

#### Article 6

The organ of administration of the municipality people's council competent for matters of national defense performs these tasks:

1. Issues certificates for workers who are serving the period of military service concerning the time spent in the performance or the completion of the period of military service (point 24, paragraph 4), and
2. Issues certificates for workers who have been in military training concerning the time spent in this training (point 28, paragraphs 4 and 5).

#### Article 7

The organ of administration of the municipality people's council competent for matters of national defense performs the tasks mentioned in articles 2-6 of this decree in the way and under the conditions as specified by the provisions by which these tasks are regulated.

In the tasks which are transferred by this decree from the jurisdiction of the military sectors to the jurisdiction of the organs of administration of the municipality people's councils, the organ of administration of the municipality people's council is obligated in the sense of article 121 of the General Law on the Regulation of Municipalities and Srezes to proceed according to the instructions and the orders of the competent military-territorial organ and the State Secretariat for Matters of National Defense.

#### Article 8

In the tasks which are transferred by this decree from the jurisdiction of the military sectors to the organs of administration of the municipality people's councils competent for matters of national defense, the processing of matters begun before the entry into effect of this decree will be completed by the heretofore competent military sector.

In matters which are transferred by this decree, a renewed process in connection with legally valid decisions of a military sector as well as the further process in the case of the annulment or setting aside of decisions of the military sectors will be conducted by the organ of administration of the municipality people's council competent for matters of national defense.

## Article 9

The competent military sector or, where there is no military sector, the competent command of a military district which performs tasks within the jurisdiction of a military sector makes decisions concerning an appeal against a decision which in the first instance is made by the organ of administration of the municipality people's council competent for matters of national defense in matters which are transferred by this decree to its jurisdiction.

## Article 10

Through the account of the State Secretariat for Matters of National Defense financial and material means will be secured for financing the following expenditures in connection with the tasks which are transferred by this decree to the organ of administration of the municipality people's council competent for matters of national defense:

1. Compensation due to workers for the time absent from work in connection with a call by the organ of administration of the municipality people's council competent for matters of national defense for recruitment, reporting, the annulment or change of a war order, examination by a specialist or an X-ray or systematic examination in connection with the military obligation as well as other tasks in connection with the military obligation,
2. Costs of transporting personnel from the transfer point if they live farther than 10 kilometers from the seat of the municipality,
3. Costs of transporting recruits in connection with induction for the performance or completion of the period of military service,
4. Costs of supplying food to recruits in connection with induction for the performance or completion of the period of military service,
5. Compensation made at one time because of the departure for performance or completion of the period of military service,
6. Costs of transporting persons obligated for military service in connection with their induction for military training,
7. Compensation to persons obligated for military service who during their military training retain their employment,
8. Payment to military personnel assigned for work in the organ of administration of the municipality people's council competent for matters of national defense,
9. Costs of official travel and other compensation which is made upon the order of the military-territorial or other military organ,
10. Forms necessary for the performance of tasks in connection with the military obligation and other tasks of a military nature,
11. Other costs in connection with the performance of tasks which are transferred by this decree to the organ of administration of the municipality people's council competent for matters of national defense in addition to regular costs of administration (personnel costs and material expenditures).

More detailed instructions concerning the method of payment and the securing of material means according to the foregoing paragraph will be issued by the State Secretariat for Matters of National Defense with the concurrence of the federal State Secretariat for Matters of Finance.

#### Article 11

This decree enters into effect upon the day of its publication in Sluzbeni list FNRJ and will be implemented as of one April 1960.

The Federal Executive Council

R. p. No 16  
Belgrade, 16 February 1960

President of the Republic,

[Signature]

Josip Broz-Tito



DECREE ON AMENDMENTS AND SUPPLEMENTS TO THE DECREE ON THE ORGANIZATION  
OF COUNCILS, COMMISSIONS, AND REPUBLIC AND LOCAL NATIONAL DEFENSE  
ADMINISTRATIVE AGENCIES

Sluzbeni list FNRJ  
[Official Gazette FNRJ],  
No 8, 24 February 1960, Belgrade,  
Pages 208-209

On the basis of article 22 of the Law on National Defense (Sluzbeni list FNRJ, No 30, 1955), the Federal Executive Council issues the Decree on Amendments and Supplements to the Decree on the Organization of Councils, Commissions, and Republic and Local National Defense Administrative Agencies.

Article 1

In the Decree on the Organization of Councils, Commissions, and Republic and Local Organs of Administration for National Defense (Sluzbeni list FNRJ, No 29, 1956), article 4 is changed to read:

"For the immediate performance of administrative and specialized tasks in the field of organizing and mobilizing the resources and forces of the country for defense as well as for the execution of decisions and conclusions of the councils and commissions for national defense, in the people's republics and autonomous units secretariats for national defense are established, and in the srez and municipality people's councils organs of administration competent for matters of national defense [are established] in accordance with article 119 of the General Law on the Regulation of Municipalities and Srezes (Sluzbeni list FNRJ, No 26, 1955; No 29, 1957; and No 24, 1959)."

Article 2

In article 7, paragraph 1 the words "the head of the secretariat of national defense of the people's council of the srez" are replaced by the words "the superior of the organ of administration of the srez or municipality people's council for matters of national defense".

Paragraph 2 is deleted.

Article 3

The title above article 13 is changed and reads "V. The organs of administration competent for matters of national defense".

#### Article 4

Article 13 is changed and reads:

"The secretariat of the people's council as an organ of administration in the people's republic and in the autonomous unit has the position and authority of a secretariat of the executive council.

"The secretariats of national defense or the organs of administration of the srez and municipality people's councils competent for matters of national defense are at the same time specialized and executive organs of the councils or of the commission for national defense

"The tasks of the secretariat for national defense in the people's republic and in the autonomous unit are directed by a secretary, and the tasks of the organ of administration of the srez or municipality people's council competent for matters of national defense are directed by the superior of that organ."

#### Article 5

In article 14 the words "the secretariat of national defense prepares" are replaced by the words "the organ of administration competent for matters of national defense prepares".

#### Article 6

Articles 15 and 16 are deleted.

#### Article 7

Article 17 is changed to read:

"The act governing the appointment of the secretary for national defense of the executive council and of the superiors of the organs of administration of the srez or municipality people's councils competent for matters of national defense is issued by the competent organ.

The concurrence of the chairman of the republic council for national defense is necessary for the appointment of a superior for the organ of administration of the srez or municipality people's council competent for matters of national defense. The appointment of a superior for the organ of administration of the municipality people's council competent for matters of national defense and of the superior for the organizational unit in that organ for matters of military mobilization is made with the concurrence of the chairman of the srez commission for national defense and upon the recommendation of the competent military sector or other competent military-territorial organ if in that territory there is no military sector.

The appointment of persons to positions mentioned in the foregoing paragraph is made without competition and in accordance with article 35, paragraph 2 of the Law on Public White-Collar Workers."



## Article 8

In article 18, paragraph 1 is changed and reads:

"The State Secretariat for Matters of National Defense may assign military personnel to work in the organs of administration competent for matters of national defense of the people's republics, autonomous units, and srez and municipality people's councils. These personnel may be appointed as superiors of these organs or as white-collar workers in these organs."

In paragraph 3 the word "secretariats" is replaced by the words "by the organs of administration competent for matters of national defense".

## Article 9

In article 19, paragraph 2 is changed and reads:

"Tasks are assigned to the superior of the organ of administration of the srez or municipality people's council competent for matters of national defense by the chairman of the people's council in matters of national defense which are within the jurisdiction of the people's council and by the chairman of the commission for national defense in matters within the jurisdiction of the commission."

After paragraph 2, a new paragraph 3 is added which reads:

"In matters which, in accordance with article 121 of the General Law on the Regulation of Srezes and Municipalities, are transferred to the jurisdiction of the organ of administration of the municipality people's councils, these organs are obligated to proceed according to the instructions and orders of the competent military-territorial organs and of the State Secretariat for Matters of National Defense."

## Article 10

This decree takes effect on the day of its publication in the Sluzbeni list FNRJ.

The Federal Executive Council

R. p. No 15

Belgrade, 16 February 1960

President of the Republic,

[Signature]

Josip Broz-Tito

## THE SOVIET T-54 TANK

Vojno-tehnicki glasnik  
[Military-Technical Gazette]  
No 8, August 1959, Belgrade,  
Pages 602-603

Technician Lieutenant Colonel  
[tehnicki potpukovnik]  
Engineer Bozidar Kovacic

It has been known for some time already that the USSR is introducing a new medium T-54 into the armament of the armored units, however more detailed information concerning it has not been known. The events which transpired in Hungary at the end of 1956, however, have given the world public a little closer acquaintance with the Soviet medium Tank. Various agencies and periodicals have published the first pictures and information concerning this tank.

Toward the end of the Second World War the USSR began building a medium tank with a 100-millimeter gun, and at the conclusion of the war it continued this work. Before the end of the war the USSR had produced the T-34 tank with a 100-millimeter gun which, because it was not produced in very large series, remained unnoticed. It appears that this was a variant tank which did not give satisfactory results, however the building of the new tank whose conception was in the main the same was conducted on the basis of this tank.

With the introduction of the M-48 (Patton) tank and the Centurion tank into the armies of the NATO countries the question of introducing a new medium tank into the army of the USSR became urgent, because one could not count on the T-34 tank being able to compare with the new medium tanks introduced into the armies of the aforementioned countries, although this tank was the best one in the Second World War.

One is struck by the light weight of the T-54 in relation to the protective strength of its armor. In fact, its protective strength is equivalent to the protective strength of the M-48 tank, although this tank weighs 50 tons and the T-54 tank weighs only 36 tons. The light weight of the T-54 gives it a considerable advantage over the M-48 tank and especially over the Centurion tank.

The relatively low weight of the T-54 tank in relation to the T-48 [M-48] and the Centurion tank has been achieved thanks to the efficient utilization of the interior space of the tank. Today, almost all of the military periodicals of foreign armies are publishing information concerning this Soviet tank and consider it to be the best among the medium tanks thus far produced.

The T-54 tank has a crew of four as do the M-48 and Centurion tanks. There is no longer the customary fifth member of the crew, the assistant to the driver. The forward machine gun which was operated by the assistant to the driver is now operated by the driver of the tank. The button for firing the machine gun is located on the handle for operating the tank. In the turret of the tank there is a place for the other three members of the crew, the tank commander, the artilleryman, and the gun loader.

We shall also cite some tactical and technical information concerning this tank which we have encountered while reading foreign periodicals. (The information cited is from the following periodicals and newspapers: Der deutsche Soldat (The German Soldier), Armor, (Der schweizer Soldat (The Swiss Soldier), Paris Match, the handbook Tasch enbuch fuer Panzer (Handbook of Tanks), and others.

The 100-millimeter model M-44 gun has been installed in the T-54 tank. The length of the gun barrel is 54 calibers. The initial velocity of the armor-piercing shell [pancirno zrno] is 900 meters per second, and its weight is 15.6 kilograms. This, in fact, is the first Soviet exclusively tank gun in distinction from the guns heretofore installed in their tanks. It was introduced into the armament [of the army of the USSR] toward the end of the Second World War and was intended to be a competitor for the 88-millimeter German tank gun.

Even during the Second World War this gun was installed in the self-propelled gun SU [samohodna ustanovka - self-propelled gun carrier] 100 which even today, in addition to the SU 152 self-propelled gun, is found in the armament of the Soviet army.

It is important to emphasize that the gun has a stabilizer for direction and elevation and that the system of observation of this tank has been improved in relation to the T-34 tank, and a successful solution for the electrical system has been found with the introduction of the servo-mechanism for revolving the turret (with a Ward-Leonard group) in combination with an electronic stabilizer for direction and elevation.

In addition to the gun the tank is armed with two 7.62-millimeter machine guns and one PA [protivoavijaciona - anti-aircraft] machine gun of 14.5 millimeters. One of the first two machine guns mentioned has been installed in the body of the tank in front of the driver, and the other has been paired with the gun in the turret of the tank, while the PA machine gun is located outside of the turret. In aiming at aerial targets this machine gun is operated from within the tank.

The BK [borbeni komplet - combat equipment] includes the gun with 42 shells, the 7.62-millimeter machine gun with 1,800 shells, and the PA machine gun with 500 shells.

In relation to other medium tanks the T-54 tank has the best protection. Its silhouette is low, and the armor is thick and placed at a low angle of impact. It is especially strongly protected from the forward side. The forward plate of the body of the tank is of homogeneous rolled steel with a thickness of 100 millimeters and is placed at an angle of 30 degrees. Tank guns, even including 100-millimeter guns, cannot pierce this plate at a distance of 1,000 meters. The thickness (of 200 millimeters) of the forward part of the tank turret represents an impenetrable armor protection against 100-millimeter guns.

Statistical data from the Second World War show that most tanks were destroyed or put out of action by hits in the center of the tank from PT [protivotankovi - anti-tank] guns. Most of the hits made on tanks were at a height of one to 1.5 meters from the ground. This means that the forward, upper, inclined plate of the body of the tank is most

exposed to hits and that it is therefore the thickest in all tanks. The side plates are of a thickness of 80 millimeters and are placed vertically. The sides of the body of the tank offer rather poor protection to the extent that the direction of a hit is vertical to the plate, however the thickness of the side plates of 80 millimeters has been more or less adopted in all modern medium tanks.

The maximum speed of movement of the tank is approximately 40 kilometers per hour and its specific power (of over 15 KS/T [konske sile/ton - horsepower per ton]) assures it of good mobility. If we also add the new type of suspension of the tank the torsion shaft), the new small-link treads, the double drive sprockets, and the new planetary system for operation, it can be said without reservation that this tank is more mobile than the T-34 tank.

The over-all dimensions of the T-54 tank are: length (excluding the length of the gun barrel), approximately 6.5 meters; width, 3.3 meters; and height, approximately 2.20 meters. In view of the low silhouette of the tank and the increased clearance of 0.5 meters, one can obtain an answer to the question of why the T-54 tank weighs only 36 tons. The small over-all dimensions have also given the tank a low weight. The treads are 0.65 meters in width, and the specific pressure increases for this tank the possibility of movement over soft terrain. This possibility is considerably greater in relation to the transit capability of the M-48 tank and the Centurion tank whose specific pressure is 0.9 kilograms per square centimeter.

At the maximum number of revolutions (2,000 revolutions per minute) the power of the motor is 600 horsepower. The relatively low consumption of fuel assures a great radius of action. Over poor rural roads and, in part, across country the radius amounts to 250 kilometers, and over good roads to 400 kilometers. This also is a great advantage for this tank over other tanks and especially in relation to American tanks.

The motor is installed transversely. Such installation has its negative and positive aspects. A reducer is necessary to connect the motor with the gear box. The reducer means an additional unit in the tank which uselessly consumes part of the power of the motor, is subject to wear and maintenance, creates noise, and increases the weight and cost of the tank, while on the other hand the transverse placement of the motor makes it possible for the length of the tank to be smaller and thereby for the weight to be less.

The combat space of the T-54 tank differs from the combat space of US tanks. The T-54 tank does not have a so-called basket which US tanks have, however the combat space of the T-54 tank is almost the same as the combat space of the T-34 tank, the only difference being that the command of the T-54 tank is exercised and munitions are placed along the side walls of the tank. Such a placement of munitions has freed the floor of the tank, and the interior height has been increased. It is not out of place to mention that such combat space makes possible good communications in any position of the turret, easier handling of munitions, and greater comfort and a sense of security for the crew.

In relation to the T-34 tank, the T-54 is more modern and technically better equipped. Especial attention has been devoted to perfecting the means of observation and communications and the apparatus for operating the turret (the gun). The physical effort required on the part of the driver in operating this tank in relation to the physical effort in operating the T-34 tank has been much reduced.

It is considered that the design of the T-54 tank has been so carried out as to offer a certain protection from radioactive radiation and from radioactive dust, and this means that it has been made capable also for combat under conditions of atomic warfare.

In any case, the T-54 tank may be considered to be a modern medium tank, and its tactical-technical characteristics fully correspond to the tactical-technical characteristics of the M-48 and Centurion tanks whose weight is far greater than the weight of this tank.

CONCERNING TRAINING METHODS AND EXPERIENCES IN THE USE  
OF VISUAL TRAINING AIDS

Bojno-ekonomski pregled,  
(Military-Economic Survey),  
No 4, July-August 1959, Belgrade,  
Pages 306-310

Quartermaster Lieutenant Colonel  
Slobodan Trickovic

The purpose of instruction is for the auditors and students to acquire and master new knowledge, habits, and skills so they are qualified for specific duties.

In order to achieve success in instruction for which, among other superiors, the instructors bear direct responsibility, appropriate instructional methods are used which must be in conformity with modern pedagogy.

In the quartermaster-finance school center primarily the following instructional methods are used in carrying out instruction: oral explanation - lectures, the solution of problems, demonstrations, experimental-laboratory work, discussion, textbooks, written work and illustrations - demonstration, tours of enterprises and units, and a period of probationary work in units and institutions of the JNA Jugoslovenska narodna armija - Yugoslav People's Army.

The enumerated methods have arisen through the development of the instructional process in the school center and, of course, also under the general influence of the development of military science and military thought, science, technology, and of society in general and especially under the influence of the development of our social reality and socialist practice. Further instructional practice will certainly make possible the discovery of new methods for carrying out instruction along with the simultaneous perfecting of those heretofore in use.

In the instructional plans and programs for every school and course within the framework of the center provision has been made for the specific material which the students must master. Every subject of instruction, however, demands its own specific methods whereby the goal of studying the subject will most surely be realized. Within the framework of the study of one subject several different methods are applied in accordance with the goal of studying a specific topic, its contents, the place where instruction is carried out, and other circumstances. In practice, different methods are frequently applied within the framework of one topic and even within the framework of one hour of instruction. The selection of methods depends also on the school preparation, the qualifications and qualities of the students, the time available, auxiliary training aids (as one of the very important factors in carrying out instruction and in the mastery of the material transmitted), and on the purpose which is to be achieved, etc.



Only when the aforementioned circumstances are taken into consideration does the instructor or the instructor collective make the selection of the most suitable methods and plan them in the course of making individual or collective preparations. In order for success in instruction to be guaranteed through the selection of instructional methods, that method is chosen with which the treatment and mastery of the respective topic will be most successfully realized. However, in instructional work certain factors may also arise because of which it is necessary to change the method of work even in the course of an hour [of instruction]. For this reason, great flexibility and a great deal of knowledge are required of the instructor.

It might be said that every instructor has his own personal method, because through previous instructional practice it has been confirmed that all instructors of the same subject do not achieve equal results in their work even though they apply the same instructional methods. This is the best proof that instructional methods are "dead words" if "life is not breathed" into them. Their value will then depend on the qualities and personal instructional traits of a specific instructor, and these in turn are the result of inclination, the breadth of general and military culture, habits, disposition, and other factors which have an influence on human qualities and especially on leadership and teaching qualities. The daily perfecting and enrichment of teaching methods along with the compulsory use and transmittal of positive (and sometimes also negative) experiences will guarantee the successful mastery of the material and the qualification of the students for their peacetime and wartime duties.

In order to ensure success in instruction and in order for instruction to be carried out according to the appropriate methods extensive preparations have been and are now being made. For every subject special instructions concerning methods have been prepared. In them every topic is divided into appropriate basic teaching questions and exercises, and for the same a specific number of hours has been determined within the framework of the entire subject. In addition to this, the place where instruction is to be carried out has been determined as well as whether the topic will be treated independently or in coordination with other school units in the course of the exercise. It has also been determined whether a given teaching question will be treated only with the students of one teaching group or by combining two or more teaching groups or within the framework of the entire class. The literary material for every topic has been determined which the students are to use in studying a given question, and the so-called primary test questions have been formulated which the instructor must put to the students in the course of examining them. The essence of the material transmitted is in fact encompassed by these questions, and through the answers to them the mastery of the most important knowledge within the framework of the material transmitted is achieved.

The instructions concerning methods which have thus been compiled have proven to be exceptionally useful. They have been welcomed especially by the younger instructors or by those who temporarily replace an absent teacher or a regular teacher who is ill.

As a special supplement to the instructions concerning methods a "Survey of the Necessary Material Supply for Instruction" has been prepared which shows which visual and other training aids and what quantities of them must be supplied for which topics and, within the scope of the topics, for which exercise and instructional question, which instructional institutions will use them and how they will use them, and which of the expendable and other instructional material is to be supplied. (This includes charts, sketches, pictures, the flannel board, instructional films and slides [diafilmovi], various conference rooms, peacetime and wartime testing institutions, drill fields, firing ranges, the chemical laboratory, and quartermaster facilities.).

The instructions concerning methods were prepared by the instructor collective for the respective subject in joint preparations and in special meetings.

However, the instructions concerning methods are not to be considered unchangeable. On the contrary, every month before coordinating instruction, planning, and the preparation of the division of work for the coming month, the instructions concerning methods are again reviewed in the training organ of the center and, where necessary changes and additions are made in the outlines and exercises which are planned for instruction during the coming month. Thus, it is ensured that instruction is in harmony with training needs and that ever newer elements whose use in instruction is necessary and cannot be postponed are introduced. In this way modernity is also ensured in the training process which is undoubtedly one of the most important elements of science in general and especially of military science.

However, in itself the use of didactic principles and training methods would not bring complete success in instruction. Thus, for example, the giving of demonstrations, written work and illustrations, experimental-laboratory work, etc., as training methods cannot be thought of without the use of the appropriate auxiliary training means or as they are called in popular language, "visual training aids". Along with other methods, auxiliary training aids have a more or less significant role. In any case, under present-day conditions modern training cannot be thought of without the use of visual training aids, because they have a significant influence on the success of instruction. With the use of these means the corresponding material from a given topic is explained in pictorial fashion along with the simultaneous oral explanation on the part of the subject instructor.

The speed of mastery of the material, clarity, and the duration of the conception, in any case, depend on the method by which they are formulated and registered in the consciousness of the auditors and students. Visual training aids have an effect on the easier and more



rapid mastery of material in this way, that the students can touch the material, see the object which is being talked about, detect its characteristics, and perform a certain practical manipulation and in this way engage more of the senses.

A talk by the instructor and visual training aids which are handled only by the instructor will not always be sufficient to explain a given training question in all of its details and to create a clear conception of it in the [minds of the] students. For this reason, in the use of visual training aids it is imperative that they be not only a means in the hands of the instructor in order in this way to formally satisfy the requirement that the students "see something" and that they "be shown something". On the contrary, it is necessary that auxiliary training aids be a means of work of which the auditors and students make practical use, that they handle and operate them during and after the hour of instruction. On the intelligent use and proper selection of visual training aids depends whether the auditors and students will be burdened with excessive "book" knowledge and frequently with too much theoretical knowledge, or whether they will be made capable of appropriate independent practical work. For this reason, especial attention is devoted to this question.

Visual training aids exert an extraordinary influence on the quality of instruction, and the results achieved through instruction depend to a considerable extent on what training aids are selected and how they are used in instruction.

The number of visual training aids is very large, and they are constantly being developed. For this reason, special attention is devoted to the question of material supply in instruction and to procurement, that is to say, the development in one's own shops of new visual training aids.

The flannel board is one of the newest auxiliary training aids introduced for use in instruction. I would like to say a few words about it.

The flannel board is a very simple, but modern, useful, and very interesting training aid. Recently, it has found wide application in the center in instruction in a majority of subjects, and it may be said that through its use instruction may be carried in any subject which has a so-called theoretical theme.

Especially large expenditures are not necessary for the flannel board. In the center this question has been solved in a very simple way. Namely, all of the existing school blackboards have been rebuilt to revolve. One side of the board was left as it was before, painted black, and the other side was covered with black flannel. In this way a flannel board is obtained with one coarse (covered) surface which easily holds the respective drawings, sketches, charts, illustrations, and the like insofar as sandpaper of coarseness No 4 or 5 is attached to the back of them or if a thinner flannel is placed on the back of them instead of sandpaper.

When such drawings are placed on the coarse or flannel surface of the board the observers (auditors and students) have the impression that the sketches or drawings are held on the board as if drawn by a magnet or as if they themselves were attached [to the board]. The technique of demonstration or "gluing" is very simple. All that is necessary is that the illustration placed on the flannel board be drawn downward slightly and pressed lightly in order for it to make the best possible contact with the coarse surface. Otherwise, the illustration would become "unglued" and fall from the flannel board.

To the extent that the method of using and handling the flannel board is simple, to the same extent are considerable imagination and thought for such instruction required of the instructor in the preparation of the appropriate flannel board illustrations (the sketch, chart, picture, survey, and the like). The instructor or the instructor collective must obtain all material in advance which it is desired to show by means of the flannel board. It is not so difficult to outline something as it is complicated to give an idea of what, how, and in what order it is to be graphically presented in the specific field of the use of the flannel board. For this reason, in connection with the selection of illustrations it is especially necessary that the instructor and the instructor collective also make a detailed preparation of the method of explaining the corresponding material and [that they] determine what explanation is to be given and what is to be said to the auditors and students along with the presentation of each chart or sketch.

The flannel board illustrations or drawings must be piled and packaged according to topics and exercises, that is to say, in the order in which they will be "glued" to the flannel board. Immediately before giving his explanation the instructor must arrange the material or illustrations on the table in front of the flannel board so that he will not be looking for them during the explanation and thereby divert the attention of the students.

The instructor takes down the "glued" illustrations in reverse order and places them one on top of the other. In order to avoid confusion it would be well for every illustration to be marked in succession with a small number not visible to the observer. Such numbers will be especially helpful to the instructor for those topics which require the showing of a large number of flannel board illustrations.

In making an explanation on the flannel board the instructor must give particular attention where possible to fill the available space. The objects which he exhibits (drawings, charts, sketches) must be well proportioned and of such size that all of the auditors and students can see them. One should avoid overloading the flannel board with needless detail, because in this way clarity will be assured. By exhibiting objects in various colors the attention of the students and auditors is attracted and activated still more, however, in this connection one should give attention to the harmony of colors and to composition.

It was stated above that the flannel board has an almost unlimited use and that it can be used in carrying out instruction in almost all subjects. It can be used especially well for showing various situations in the field of tactics and of the combat quartermaster service.

Among other things, the use of the flannel board in instruction provides the possibility for the auditors and students themselves to think about how the same material might be presented differently on the flannel board and how the flannel board might be used still better.

Finally, it should be said that the use of the flannel board saves instruction time. Instruction is direct and plastic, and it is given still more life. By using the flannel board the attention of the students is increased to the maximum, because they see pictorially that which has been told them and thereby the power for mastery of the material is very much increased.

The flannel board as a new training aid is very inexpensive, and every training institution and unit in which the most varied lectures are held can be easily and rapidly supplied with such boards.

Because of limitations of space I am unable to write about other auxiliary (visual) training aids which are being used in instruction at the center. In any case, it should be mentioned that the use of these aids is approached entirely in a planned way. Along with the monthly distribution of work the following special supplements are compiled each month for the following month.

A survey [is made] of the use of central training establishments (which concerns: tactics, ABHO [atomska bakteriološka hemiska odbrana - atomic, bacteriological, and chemical defense or ABC defense], food supply, quartermaster equipment, material-finance transactions, the practice of quartermaster techniques, the chemical laboratory; the experimental establishments: the regimental quartermaster warehouse, the storeroom for winter supplies, and the experimental kitchen; combat quartermaster facilities at the quartermaster area: PInSk [pukovsko intendantsko skladište - regimental quartermaster warehouse], PInR [pukovski intendantski rajon - regimental quartermaster region], BInSt [bataljonska intendantska stanica - battalion quartermaster station] - of the field and mountain types, PMC [possibly, pukovski medicinski centar - regimental medical center], the field laundry, the water station, and various physical culture facilities and halls).

In addition to the aforementioned survey, a special survey shows all of the other material means which are not included in the composition of central training facilities but which are needed for carrying out instruction during the following month.

The aforementioned surveys are a component part of the monthly distribution of work and as such are bound together in the form of a book and are used in carrying out instruction.

Through such planning of material supply the possibility is reduced to a minimum that certain visual and other material aids will not be supplied on time and will not be used in carrying out instruction in the schools and courses at the center.

## POSSIBLE USES OF THE VOJIN SERVICE IN COASTAL DEFENSE

Mornaricki glasnik  
[Naval Gazette],  
No 3, March 1959, Belgrade,  
Pages 314-320

Lieutenant Colonel of Aviation  
(potpukovnik avijacije)  
Nestor Gabrovsek

In order that a clear conception might be gained of the use of the VOJIN service in coastal defense it is necessary to be acquainted with its possibilities and some peculiar characteristics in relation to the coastal sector. I would therefore like to refer to some questions of particular importance for the defense of the coast and of vessels at sea and at the same time for the defense of the country.

We view the coast with its islands primarily as a frontier or border strip in relation to a possible attacker from the sea. Since the units of the RM [ratna mornarica - navy] have as their primary task the hindrance of an attacker in the realization of such an intention, the consideration of the uses of the VOJIN service in the defense of the coast must first of all treat this case, however, since action by aircraft and from the land are possible it will be necessary also in short outline to refer to this case which is of a specific nature if I might so designate it.

We will consider our specific case where we view the coast as a frontier against a possible attacker from the sea. The basic function of the VOJIN service consists in assuring the discovery of enemy formations as far as possible from our shore, that is to say, as deep as possible within the territory of the possible attacker. The organization of the VOJIN system has as its goal to ensure control of air space at all altitudes from sweeping flights to flights at high altitudes and also flights over our land frontiers where this task is sometimes much more difficult to carry out because of high mountains which form barriers to radar observation.

In distinction from objects on land which may be the targets of attackers from the air and are located comparatively far to the rear so that it is necessary for enemy aircraft after flying over the front lines to fly over our territory in order to reach the area of the target, on the shore, that is to say, on the sea we have a different situation. The targets of the attacker are located on the sea or on the shore itself which means that in the sense of the situation on land it is as if they were located on the very front line, that is to say, on the frontier or in the immediate vicinity of it. In addition to this, in distinction from the land terrain, whether it be flat or mountainous, the surface of the sea makes possible sweeping flight by which concealed approach and surprise can best be achieved. To be sure, this would be a considerable advantage for the attacker were it not for a circumstance which reduces this advantage to a considerable degree. In view of the surface of the sea which has no obstacles

it is possible for radar equipment to assure control of the air space over the surface of the sea from sweeping flight upward. I will therefore first of all cite some information concerning the possibilities of observation radar in relation to its characteristics.

The sea surface especially when the sea is calm represents an ideal reflecting surface for radar equipment which operates on the principle of the use of surrounding terrain as a reflecting surface for the purpose of achieving its peak operating performance.

If we consider what possibilities of observation the observation radar has when placed in the vicinity of the sea surface, that is to say, on the coast (see illustration 1.), we see that, depending on the characteristics of beaming on a vertical plane, it catches targets beginning with sweeping flight at point A to the highest altitudes at point B.

The range at which we will be able to track a low-flying aircraft and even ships (and other floating objects) is limited by the LRH [linija radarskog horizonta - line of the radar horizon]. This line represents a tangent to the curvature of the earth increased by four-thirds of the radius of the earth at the point at which the radar antenna is located so that the range is greater than the optical horizon. There is therefore some small rolling of the electromagnetic waves. It is nevertheless not sufficient for the possibility of tracking targets at low altitudes to be extended to any significant degree. It is known that because of various influences which are the result of changeable atmospheric conditions anomalous expansion of the electromagnetic waves occurs so that at individual periods of the day observation of low-flying aircraft is made possible far beyond the normal ranges of tracking (See illustration 1, point C.). However, we dare not and cannot count on this, because it represents only an exceptional phenomenon, while for normal planning it is necessary that we adhere to the normal diagrams of beaming. We have, however, much more favorable results and greater possibilities in tracking low-flying aircraft if the radar antenna does not make use of the terrain for reflection but rather operates on the principle of free beaming. This antenna is today known as the "cosecant-squared antenna". A majority of observation radar sets are today equipped with this antenna which makes possible the placement of the radar equipment in any location regardless of the surrounding terrain. Radar equipment with an antenna of such a type can be placed at elevated points which surmount orographic obstacles thereby considerably improving the possibilities of tracking low-flying aircraft. Antennas of these radar machines may also be directed in the sense of changing the angle of inclination (elevation). Thus, it is possible to direct the beam downward and to observe still more terrain in sweeping flight. In illustration 2 we see that with a radar set placed in an elevated area of the coast we can observe the sweeping flight of aircraft and ships at great distances from the shore. If we change the inclination of the antenna in the sense of the negative angle of elevation these possibilities will be increased still further (See illustration 3.).



Our coast offers very favorable locations for all types of radar and particularly for these latter types. Elevated points on islands are very favorable for the placement of observation radar and as a result of their outward location [from the shore] their useful range in relation to the [range from the] shore is extended to a comparatively great degree. This is significant because of the fact that individual islands in any case represents an obstacle to radar observation from the land insofar as they are located in front of the radar position (See illustration 4.).

By placing radar equipment at selected points on the land which are elevated to the necessary extent above the relief of the island the observation of low-flying aircraft on the open sea can also be achieved from the land (See illustration 5.).

With such a placement of radar equipment voids or dead spaces may appear which it is necessary to observe with additional radar equipment of shorter range or by means of visual observation stations (See illustration 6.).

Continuity of tracking is of special importance because every void in observation on the open sea makes possible for the attacker an uncontrolled approach, and we cannot count on other information from observation in addition to radar observation. However, from what has been said thus far we see that the continuity of observation and tracking on the sea may be in question only in connection with flights at low altitudes, while ideal conditions exist for the observation of flights at medium and high altitudes with the use of radar.

Coastal radar equipment for the control of shipping as well as ship's radar may serve well for additional observation especially of low-flying aircraft. Information from this radar equipment may be of special benefit also as a supplement to observation through the VOJIN system and also assure control of air space in those areas of the coast where for whatever reason it would be impossible or unfeasible to place VOJIN radar stations. In addition to this, the information from the VOJIN service should be supplemented by information from visual observation stations of the OSOJ [Osmatracka sluzba obale Jugoslavije - Yugoslav Coastal Observation Service], because they are especially useful where low-flying aircraft are concerned. In this connection it is most important that the information be supplied by the speediest means to the nearest VOJIN element (radar observation station or station for guidance). Therefore, secure communications must exist between the individual elements of VOJIN and OSOJ. In principle, the diagram for connecting these elements may be as shown in illustration 7.

This connection of the VOJIN elements with the elements of OSOJ also makes possible the reporting of information on the movement of ships which are observed by the VOJIN system. The information is important to the OSOJ service.

According to the possibilities for observation thus far explained, the VOJIN service can supply timely information of the flight of aircraft over the sea from sweeping flight to flights at the highest altitudes and report this information to units and establishments of the RM, RV [ratna vazduhoplovstvo - air force], KoV [kopnena vojska - land forces ], and CZ [civilna zastita - civil defense].

In any case, this consideration would not be complete if we were not to assume the possibility of flights of enemy aircraft from the interior toward the coast. In this case which is not of a specific nature, the attacking aircraft would be exposed to observation by the VOJIN system which consists of a series of ROS [radarske osmatracke stanice - radar observation stations], stations for radar observation and guidance (VOJIN), and additional visual observation stations. Their information is reported by the most direct route to the OSQJ center and through it to other interested users.

Where any flight of enemy aircraft is concerned whether it be from the sea or from the land, after its discovery the two most important operations are to determine its identity and notification. On the speed of these operations depends the usefulness of the information and the effectiveness of the defense.

Namely, we must determine the identity of the discovered formation as quickly as possible in order that we might know exactly whether the formation discovered is really an enemy formation. This task can be carried out if we possess certain and exact information concerning the flight of our own aircraft. This can be achieved by adhering to planned flights or through the timely notification of any change in plan.

In the determination of the identity [of aircraft] electronic means of recognition in the form of special signs on aircraft which are shown on the screen of the observation radar equipment in the form of signals or identification numbers are of still greater assistance. Identification may be made at the VOJ [vazdusno osmatranje i javljanje - aerial observation and reporting] at radar stations for guidance, and even at radar observation stations, at these latter stations usually only by electronic means.

Information concerning enemy formations must be supplied in the speediest way to interested users, to units of the RM on land and at sea and to the PVO [protivovazdusna odbrana - anti-aircraft defense] commands for the purpose of undertaking active and passive measures. The most speedy notification is achieved if the information from the VOJ center is transmitted directly to the command of the unit of the RM or to the vessel at sea, and all of this demands an organization for the explanation of this information and the making of a decision by the appropriate superior. Therefore, this method is somewhat slower because the aforementioned operations cause delay, greater or lesser depending on the skill of the one initiating the action (postavljac) and the speed of estimating the situation and making a decision. The delivery of information regarding aerial observation dare not be subject to interference by the enemy, and the most effective means of doing this is through wire or radio relay communications.

The notification of vessels is possible to achieve only through radio communications, and the secrecy of information must therefore be preserved by the use of code. However, very effective notification of vessels can be organized by reporting only that information which is of immediate importance for the vessel itself. In this way the reporting of this information to all vessels is avoided. The timely notification concerning the approach of an enemy formation makes possible to undertake active and passive measures of defense against attacks from the air. For this reason, the utmost attention is today devoted to perfecting the VOJIN organization throughout the world. The high speeds of modern aircraft and guided missiles demand the automation of the entire process of discovery and notification.

By becoming acquainted with the organization and the methods of using information of the VOJIN service one can best understand the possibilities for coastal defense, that is to say, the measures which should be undertaken in order that we might effectively counteract the speeds with which aerial targets today appear.



## DEFENSE OF VOJIN UNITS

Vazduhoplovni glasnik  
[Flight Gazette],  
No 3, May-June 1959, Belgrade  
Pages 239-246

Major of Aviation  
(Major avijacije)  
Milo Lekovic

The employment of aircraft of great speed and with a great radius of operation and with rocket projectiles raises the need for a comprehensive organization of anti-aircraft defense and especially the organization of the timely discovery and reporting of information of aerial observation. The role of timely discovery and reporting of information is increased by the existence and the possibility of the use of atomic and hydrogen weapons for combat purposes. This makes the VOJIN service one of the basic elements of PVO [protivovazdusna odbrana - anti-aircraft defense], because these are the tasks which it performs. Through its objective and subjective qualities it contributes to the elimination or diminution of the effects of aerial attack regardless of whether it concerns an attack with conventional or atomic weapons.

In a possible future conflict, the principle of surprise will have and will require greater use than has been the case in past wars. In order to achieve surprise in aerial attacks it is necessary to make it impossible for the opponent's VOJIN service to function. On the other hand, in order to avoid surprise, the VOJIN service will play a primary role, and this is its basic purpose and function.

Therefore, the VOJIN units in their positions will be among the primary targets in the opponent's plans for campaign action.

Since these are targets of small dimensions and of greater precision, they can easily be camouflaged and placed in such positions that it is very difficult or impossible to detect them. Thus, radio direction finding and the agent service will have and play a significant role in the discovery of the distribution of radar positions and of the radar network as a whole. The discovery of the frequencies on which radar equipment is operating can have very adverse consequences for the work of the VOJIN service and through it on the system of PVO regions into which enemy combat activity from the air is directed. In the future, electronic warfare will have one of the primary positions in the plan for campaign actions of belligerent countries for the smashing of the power of their opponent. For this reason, information concerning electronic equipment, especially radar and the radar network, must be preserved in the greatest secrecy.

All measures will be taken for destroying or neutralizing the work of VOJIN units, in this connection making use of various means and methods of action beginning with electronic jamming and up to and including direct attacks on the same. These direct attacks on VOJIN units in their positions might come from the air or from the ground.

Because of this, VOJIN units are forced to take all measures for defense beginning with the campaign against radar jamming, defense against attacks from the air, defense against attacks from the ground, and up to and including a struggle against saboteurs and similar enemy actions.

### The Campaign Against Radar Jamming

In order that measures to combat radar jamming might be successfully undertaken it is necessary always to be prepared and to clearly understand that the enemy will try to jam and interfere with the opponent's radar observation in order to make it difficult for him to observe and track aerial targets. This will become particularly evident when some important enemy operations are in progress. If the radarman is careless about this and is not prepared for work and combat under such conditions the jamming will be effective, and the enemy will achieve his goal. The enemy will achieve his goal at a specific moment when the radarman by not thinking about enemy jamming halts the operation of the radar machine in order to find a defect which has "arisen" in the radar equipment because this seems to him to be the service which is desired. The enemy will then have success if the radar operator momentarily does not find his bearings. While he is collecting his wits enemy aircraft may reach the target and by their surprise appearance avoid the effective counter activity of the means of FVO of the target concerned. Therefore, for successfully combating radar jamming the radar operator must observe the following principles in his work:

1. Be constantly prepared for enemy jamming to recognize various types of jamming and their sources;
2. Continue radar operation regardless of enemy jamming;
3. Know how to distinguish intentional enemy jamming from chance defects in equipment and disturbances from various pieces of electrical equipment which are located in the immediate vicinity of the radar machine or the position, because they produce similar phenomena on radar screens;
4. Immediately notify a responsible superior concerning enemy jamming and the directions from which the jamming is appearing; and
5. Know how to take appropriate countermeasures.

The measures against radar interference encompass all of those actions which have as a goal the elimination of enemy interference or diminishing its effect. These measures depend on and are adapted to the equipment and its characteristics.

In the case of radar equipment which uses a cosecant antenna, jamming from an aircraft or from the ground may be avoided by inclining the antenna above or below the altitude from which the jamming is coming. The degree of success which can be achieved in this case depends on the rigidity of the antenna bundle or the capacity of the equipment for separating undesired signals by means of very direct beaming of the antenna.

The eye of the radar operator is also one of the essential elements in combating radar jamming. A well-trained radar operator can distinguish the reflection of the true target from the reflections of interference, while this would be impossible for the ordinary observer.

Jamming is usually done in one or several directions depending on what one wishes to achieve by jamming (concealing flights of aircraft or deception), while the other sectors would be clear and free of jamming. In these clear and unobstructed sectors it is possible to carry out the observation and discovery of aerial targets. Through the coordination of the operations of two neighboring radar stations whose radar machines operate on different frequencies the jammed sectors can also be avoided.

The use of the type A screen, which in any case is less subject to jamming than the PPI screen or some other screen, the effect of jamming will be significantly reduced. On this screen the wave form of the jamming signals is not the same as the wave form of the signals of a constant reflection.

Radar operators and their superiors must know all of the methods of combating radar jamming, of which there are considerably more than are mentioned here, and make use of them when the situation demands it.

When the enemy notices that his radar jamming is not achieving the desired goal, he then undertakes aerial attacks on VOJIN units in their positions.

#### Defense Against Aerial Attacks

One of the more effective ways of making impossible the functioning and work of the opponent's VOJIN service is aerial attack of the stations for radar observation, reporting, and guidance. Because of this, defense against attacks from the air is one of the basic elements in the protection of VOJIN units in their positions.

Through the organization of defense against attacks from the air it is necessary to achieve protection from aerial attack and reconnaissance. This organization embraces the fortified arrangement of the position, a firing plan for anti-aircraft weapons, and camouflage.

The fortified arrangement of the position encompasses the preparation of shelters for personnel and materials and the preparation of shelters for equipment and guns for protection and shelters for [transport] means. An effective method of protection from enemy attacks from the air is the preparation of underground shelters for vital objects of the units such panels of radar equipment, rooms for briefing and guidance, and communications means so that only the antennas of the radar machines and of communication means are left on the surface. The surest method of protection would be to have the position furnished with a fortification arrangement [which would permit] the mechanical and automatic raising of antennas above the surface of the ground for the purpose of observation when the unit is not being attacked or for

retracting the antennas below ground when the unit is being attacked or for the purpose of repair and inspection of equipment. In this way prolonged and secure operation is achieved regardless of enemy air activity and regardless of the fact that the location and areas of radar positions are known to the enemy.

For this reason, all of the elements of a VOJIN unit which comprise the system of observation, reporting, and guidance must be built underground in the way explained above. This is possible to achieve in units of the third line of radar positions and in some units of the second line in view of the fact that these positions are of a more permanent character, are located on terrain difficult of access, and are farther in the rear. In this connection, it is easier also to organize defense against ground attack.

The fortified arrangement in temporary positions and on terrain used for maneuvering cannot be carried out according to these principles because the method of operation of these units is developed more in movement, and the time element makes it impossible to carry out extensive and difficult earth-moving work. In these cases it is necessary at the same time to solve the problem of the grouping of the unit for defense against ground attack and dispersal for protection from attacks from the air. Grouping the defense against ground attack is essential in view of the limited possibilities for defense with one's own forces and because rapid and correct operation is required in the performance of basic tasks. Dispersion is necessary in order to avoid having several elements of the unit put out of operation at one time.

One of the ways of solving these problems is in a distribution of radar equipment and the elements of reporting and guidance in such a way as to avoid the annihilation or damaging of two or more elements by the combat means of one aircraft in one strike - the preparation of field-type shelters for means and personnel and the organization of circular defense with a group system of locating positions along with a well organized system of fire. Since it is necessary in advance to plan, find, and prepare radar positions along with the development of detailed plans for units of the KoV [Kopnena vojske - land forces] both in attack and in defense, the selection of positions should be made in terrain more difficult of access along with the timely construction of access roads to the positions. The roads must provide for the concealed movement of the unit to and from the position. The best solution will be found in acting according to the concrete situation, and for this reason the superiors in the VOJIN units must be familiar with the appropriate laws and regulations which are the product of the experience gained from combat action in past wars.

The operation of a VOJIN unit can be made impossible by putting out of action (damaging or destroying) its radar equipment [used] for observation, measurement of altitude, and guidance. Because of the precise nature of the targets which are difficult to detect from the air, the enemy is forced to strike at them from low altitudes with individual aircraft, with artillery and machine gun fire, and by aiming

at each individual target. Therefore, the anti-aircraft defense of VOJIN units must be organized primarily for repulsing enemy air attacks at low altitudes. For this [purpose] it will be advantageous to make use of multi-barreled anti-aircraft machine guns and IRAA [long-range anti-aircraft artillery]. Because of this, the system of firing plans for repelling enemy air attacks is also to include the fire arms of the unit which will be effective if their use is well organized. Since each VOJIN unit constantly checks the air situation on its radar screens and is familiar with the ground situation in its area the timely and proper manning of positions with the forces necessary for repelling air attacks does not come in question regardless of the direction from which the attack comes.

Camouflage is an effective method of protection from air attacks which is carried out in VOJIN units for the purpose of completing the defense both for protection as well as for deceiving the enemy concerning the exact location of the positions of the object of an action and concerning the distribution of forces and means at a radar position. For this to be achieved camouflaging must be based on the following principles: continuity, natural appearance, diversity, and a high quality of camouflaging work.

Once the camouflaging has been completed it must be systematically maintained and restored. For this reason, a constant check of camouflaging is necessary, and all changes which have taken place as a result of changes in the nature of the surrounding terrain or the damaging of camouflaging must be corrected and touched up, because camouflage must reflect the nature of the surrounding terrain. Every object which would be foreign to the picture of local conditions could produce results contrary to those desired. This requires that the principle of the natural appearance of camouflaging be constantly maintained.

Partial camouflage will not of particular benefit, because the uncamouflaged objects will betray the radar position and serve as good orientation for the discovery and destruction of vital objects and means at a radar position. Therefore, every time camouflaging has been begun it must be carried out completely and must include all elements of a radar position.

If a radar position can be discovered through radio direction finding this does not mean at the same time that the effectiveness of enemy actions against it will be achieved, because as we have explained before direct aiming is necessary for the annihilation or damaging of an object at the position, and this is difficult to achieve if the object is not seen or if the location of the position is not known to the enemy in detail. The unit will cease observation and reporting operations during the time of an approach of enemy aircraft. This will make it impossible for the enemy to direct his aircraft to the targets at a given position by means of radar or radio. This, together with carefully prepared camouflage and a well organized system of fire for repelling enemy air attacks, will prevent the unit from being put out of action through the damaging or destruction of any object at the position. Upon the departure of enemy aircraft the unit again continues the work of observation, reporting, and guidance.



A smoke screen may be used to advantage for the purpose of concealing a radar position if the following conditions are satisfied:

a. The smoke screen must be at least 3-10 times greater than the surface of the object which is being concealed. This is to say, adjacent object which enemy aircraft may use as points of orientation for the destruction of objects must also be covered by smoke. The radius of the smoke screen dare not be less than 0.5 kilometers.

b. The object screened must not be in the center of the smoke screen which must also be higher than the highest point of the object screened. Smoke screens are also to be created at false locations.

c. The smoke screen must not obstruct the activity of one's own PAA [protivavazdusna avijaciona artilerija - anti-aircraft artillery].

d. Smoke screening must be begun in good time. It is possible to do this in VOJIN units in view of the possibility of following the air situation. The smoke is maintained during the entire time of the flight of enemy aircraft.

Smoke screening can be carried out by means of smoke pots or by local means (the burning of green leaves, fir or birch wood, moistened hay or straw, thick oil, pitch, and the like). The organization of smoke in the depth of territory and in isolated positions is to be carried out in a circular fashion. The smoke-producing means are to be distributed in two, three, or more circles about the object to be covered by smoke. Every point in the smoke circle forms a focal point, and the number of points depends on the circumference of the circle in which they are placed and on the diameter (sirina) of the smoke cone at the source of the focal point.

#### Combating Saboteurs

The next measures which the enemy will undertake for the purpose of paralyzing and putting out of action an opponent's VOJIN service are acts of sabotage.

The experiences of our NOR [Narodni osvobodilacki rat - National Liberation War] tell us that acts of sabotage are an effective method of action deeper in the rear of the enemy. The sending of saboteurs will be accomplished by all means available which can be used for this purpose (submarines, parachutists, and other means). In addition, the enemy will make use of opponents of the regime or the unfriendly disposed populace of the country in which the actions are undertaken.

VOJIN units in their radar positions will be targets of prime importance for the activity of saboteurs in view of the fact that combat actions from the air have little effectiveness. Land attacks by forces of the KoV will be rare because they will be thwarted from achieving the desired effect by well-trained radar operators. This makes it very clear to us that special attention must be devoted to protection against saboteurs. All of the work and material expended in arranging defense for the purpose of effective protection against

saboteurs will be repaid if we succeed in preventing their penetration of the defenses of the positions and seizing the object of the action. The target of an action in this case may be the radar set, the cables leading from the radar set to the hall, communications centers, or the cables for communications at the position (insofar as they are not buried in the ground).

Acts of sabotage are undertaken after comparatively long and thorough preparation, and nighttime or poor weather conditions are normally used for carrying out the same. Therefore, in quite a few cases not even successive, numerous layers of carefully placed obstacles will halt or detain skilled and daring saboteurs in their missions. This necessitates that the defense be strengthened with still other elements such as guard dogs, the establishment of communication among the elements of defense, and the use of secure internal communication.

The defense against saboteurs demands a well organized alarm system (the means of sounding an alarm and methods) synchronized with countermeasures for capturing, driving out, or destroying saboteurs. Every bunker and every guard position must be connected by an electric bell, and every bunker [should also have] a telephone wherever possibilities permit. Each one should also be connected with the objects where the forces for manning the positions are quartered.

Communications are established with the territorial units of civil defense of neighboring regions and with the local organs of government for the purpose of obtaining information concerning the appearance, movement, or capture of saboteurs. The organization of cooperation with these elements must be sound, close, and constant.

#### Defense Against Ground Attacks

Unsheltered radar equipment is susceptible to the effect even of short range fire arms.

Although VOJIN units are disposed farther in the rear, they may be attacked by saboteurs, airborne or amphibious landing forces, and committed enemy units. When we add to this the fact that individual VOJIN units are alone in separated positions their vulnerability is increased and demands a comprehensive organization of defense.

Therefore, the defense of VOJIN units be organized according to the principle of defense organization of defense sectors whose basic defenses comprise strong points placed and arranged in a circular disposition about the radar position.

The defense of VOJIN units which are located in regions occupied by forces of the KoV, RV [ratno vazduhoplovstvo - air force], or PM [ratna mornarica - navy] must be organized so that they are included in the defense organization of these units regardless of whether operational or territorial units are concerned.

The organization of the defense of VOJIN units against ground attacks must protect vital objects of the units against the fire of short-range firearms. This can be achieved by arranging the defense of only one defense line with the group system of manning positions and with protection provided by guards posted in forward positions [pretstrazarsko obezbedjenje]. The necessary number of strong points are to be arranged at a distance of 100-150 meters immediately around the positions and be mutually connected by obstacles and by overlapping fire. Superiors in the units determine the time and forces for manning these strong points in accordance with the situation. Guards or sentinels are to be placed in front of this line at points which dominate the terrain and in the case of maneuver areas at [a distance of] 600-800 meters. In this way, the depth of defense and its security are to be increased. The area in between is to be checked by patrols.

It can happen that some VOJIN unit will be attacked by forces stronger than its own which are either forces landed from the air or from the sea (airborn or amphibious landings) or sent through the intermediate areas of units in position. The attack may be launched from all sides at the same time. A unit thus attacked will conduct combat according to the principles of combat in encirclement. For this reason, the defense must be based on well-organized cooperation with forces which are active or are located in the immediate vicinity of the given VOJIN unit.

The work of the VOJIN service is constant regardless of the time of year or day or weather conditions. Therefore, its vigilance and defense must also be constant. Since attacks at night and under poor weather conditions are almost a normal type of activity especially in the rear, all measures for vigilance and combat readiness must be taken which such conditions of operations demand such as strengthened reconnaissance activity, the illumination of spaces between individual strong points in front of it, the sending of periodic patrols, the use of short-range firearms, and the determination of reserves of smaller forces.

Units dispersed in mountainous or rugged terrain organize a defense according to the principles of defense under those conditions which in the main would appear as follows: to observe approaches and numerous dead spaces and to strike them frontally with oblique or flanking fire. The entire firing system must be connected with a system of blocking by means of the broad use of natural obstacles.

The work of the VOJIN unit in the performance of its basic functions dare not be interrupted. Both the operation and the defense of the unit depend to a large extent on the ingenuity and the capacity for organization of its leaders. When it is necessary to engage stronger forces for the defense of a unit, especially in connection with repelling attacks from all sides, then for the performance of the primary functions of observation and reporting the minimum complement necessary for carrying out the most essential duties is determined. All of the remaining personnel are used for repelling attacks and safeguarding the work of the crew on duty. It is necessary to keep this in mind because the enemy



will coordinate air attacks on a large scale against targets which are located within the scope of the zone of observation of given VOJIN units. However, to the extent that the situation demands this, the work of observation and reporting may be halted completely and all personnel may be engaged for the defense of the unit.

Regular reconnaissance of the surrounding terrain by means of visual observation and the occasional sending of patrols as well as the organization of cooperation with neighboring territorial or operational units of the KoV, RV, and RM and with organizations of CZ [civilna zastita - civil defense] give the leaders of VOJIN units a survey of the land situation at the front and in their region at all times of the day and night. This assures the timely taking of measures for protection and the blocking or repelling of the attacks of stronger forces, diversions, or similar actions which the enemy would undertake. Gaining a knowledge of the attitudes of the surrounding populace is one of the tasks of leaders of VOJIN units according to which precautionary and safety measures and likewise the use of their assistance depends.

## THE MOBILE ENCAMPMENT

### The Method of Carrying Out Exercises and the Quartering of Units

Vojni glasnik

[The Military Gazette],  
No 7-8, July-August 1959, Belgrade,  
Pages 66-69

Major Stjepan Lukacevic

The mobile encampment today occupies a significant place in the comprehensive training of units. In it the troops and leaders are accustomed to conditions of living and combat actions approximating those in wartime. In view of the purpose which has been given to it, it would not be suitable if the mobile encampment were to be reduced to carrying out those tactical operations which could also be carried out in the neighborhood of the garrison of a unit or if it were not differentiated with respect to the location, life, and work from the permanent encampment which individual schools practice.

In determining the length of time and the selection of terrain and topics which will be treated in the mobile encampment it is necessary to keep in mind a number of circumstances which will exert their influence adversely. Full attention must be given to the consideration of all of these influences and, without losing sight of the primary purpose of the mobile encampment, to bringing them into the desired harmony. After this is achieved, one sets about compiling the tactical prerequisites.

The leaders who will direct the exercises should make a timely inspection of the terrain for the purpose of compiling the tactical prerequisites. It is desirable that they be clear and concise, that is to say, that they comprise only the information absolutely essential for the one carrying out the exercise. It is not essential to compile the prerequisites for every tactical operation. It is sufficient [for this to be done] merely for the initial one. For example, if an approach march is continued into the attack and this develops into pursuit it is sufficient to compile the prerequisites merely for the march. All of the other tactical operations will later be derived from it.

### The Method of Carrying Out Exercises

The method of carrying out exercises in the mobile encampment should differ from the methods used in garrison or in the permanent encampment. Its application will depend on the training section in which the mobile encampment is to be carried out. In the main, the exercises will be carried out most frequently with two sides with a realistic ratio of forces, for example, one unit on the defense and the other two units on the attack. In such a case, each one [of the attacking units] would attack its part of the front, and they would be related to each other as neighboring units. In this method, the director of the

exercise should have a significant role in coordinating the operations of the units both of those on the attack as well as of the one on the defense. Thus, good continuity is assured throughout the tactical operation, and during the action no misunderstanding arises between the attacker and the defender.

According to the other method, one unit might, for example, be on the attack and the other on the defense. Hence, to achieve a realistic ratio of forces it is necessary for certain forces to be designated. The operations are usually more realistic than in the first method, because one side is directed by one commander and the other side by another commander of a unit. However, in the course of an operation it is essential that realism be represented to the ultimate limits because even the slightest partiality can lead to disputes about who has made this or that error in movement.

It is best whenever possible to plan and jointly carry out amphibious and detachment exercises in the mobile encampment. For example, the "blue" side carries out an amphibious exercise and forms an approach march, defense, and withdrawal, and the "red" side carries out a detachment exercise and forms an approach march, attack, and pursuit. The march would not begin simultaneously for both sides but [its beginning] would depend on the length of the march route for each side. During the march both sides would take security measures as prescribed by regulations and in accordance with the concrete situation. The line of encounter could be determined as a means of orientation, because if this were not done one side could halt at the most favorable line and here be organized to await the other side. Thus, one side would be placed in an unequal position, and in itself the training of the troops and leaders would not bring the desired results. The beginning of the engagement should be developed gradually, that is to say, in the way that it would be developed in an actual situation. In a realistic action the "reds" will press the "blues", and these because they are weaker will logically go over to the defense, and for this very reason the "reds" will go over to the attack. The "blues" on the defense would give resistance while trying to hold the defended terrain, and the "reds", since they cannot achieve any particular results in the beginning, could make an attempt at throwing in comparatively small units for purposes of reconnaissance or diversion which would happen rather frequently in wartime. The "blues", because of the superior power of the "reds", retreat while trying to carry out all phases of withdrawal, and the "reds" go over to the pursuit. Such an exercise which would consist of several tactical operations would continue without interruption for 3-4 days and sometimes longer.

In addition to these methods there are also others. However, which of them will be applied depends on the selected tactical operations which we desire to carry out immediately, the terrain, the season of the year (During the winter we will not be able to carry out several tactical operations without interruption because of the cold.), atmospheric conditions,

possibilities of supply, etc. Aside from the method, in all exercises, through all tactical operations and at various times of the day and night the troops should be trained in the various duties in which they were instructed at the very beginning of training or were not instructed at all, for example, the duties of observer, courier, munitions bearer, tank destroyer, etc., because the troops will properly understand these duties only when they have seen their importance in conjunction with the larger exercises.

Regardless of what method will be used in the mobile encampment and at what time it will be conducted, certain facts should be taken into account, because if they are neglected the very success of the mobile encampment would be brought in question. Rest for personnel should be given top priority, because personnel must somehow be assured at least a few hours of rest if the exercise is conducted continuously, for example, for 3 days and 3 nights. In order to ensure this it is necessary by means of the realism of the action to create a certain lull which there will be even in war so that personnel might take turns resting. Personnel should not be withdrawn from the positions for the sake of rest, but rather they can rest in combat formation just as they would do in actual combat actions.

In addition to rest for personnel it is important to properly organize the supply of food. Insofar as it is possible, one should try to augment the food during the mobile encampment. The apportionment of food should not be made at the customary times as in garrison, but rather food should be distributed to the troops in position only when a certain lull is created in the action and when concealed transport is possible. This will usually be a night and during the day when the terrain provides cover, and concealed movement is possible.

The supply of munitions should be carried out in position so that munitions are brought up from organized detachment stations for combat needs. Sometimes it will be useful also to create situations which are such that the supplying of munitions is made difficult and for a certain time even impossible so that the troops might become accustomed to conserve ammunition. In addition to this, in all exercises it should be required of the troops that they dig in so that they might be taught speed and correctness in digging in and camouflaging. In the vicinity of the garrison there are usually no conditions for this.

#### The Quartering of Units

Quartering in a mobile encampment can be organized in several ways such as in tents, in private and public buildings, and in a combination of tents and trucks or in tents and private and public buildings.

When units are quartered in tents it is desirable that the troops carry tent halves with them and when they reach the place where they will camp temporarily that they themselves pitch the tents. In pitching [the tents] they should not proceed in the customary way of placing the tents

in the open on flat terrain and the like. Rather, they should put them in forests and groves so that they cannot be observed from the ground and from the air. This means that the tents are to be placed in those locations in which they will be placed during a war.

Quartering in private and public buildings should be avoided wherever possible, however if camping is done in the fall, winter, or spring we will frequently be forced into such quarters. In such quarters it is necessary to take into account sanitary and hygiene conditions, water for drinking, discipline, and other components which influence the success of the mobile encampment.

A combination of quarters can result more often especially during rainy and cold days. The most frequent combination will be for one part of a unit to be quartered in tents and the other part in private and public buildings. If the unit is motorized and is not located near a populated place then the combination can be such that part of the unit is quartered in trucks and the other part in tents. Regardless of the type of combination the sanitation organs and units with sensitive material should have priority.

One of the special questions is how long to stay in one place. Although the very words mobile encampment tell us that it cannot be kept in one place for a long time it is nevertheless necessary to say something about this also. One should remain in one place until the exercise is carried out, until the unit rests after the exercise, cleans its weapons, and puts its equipment in order and the like. How long a time this will be cannot be determined because all of this will depend on the tactical operations which we intend to conduct. For example, if we carry out without interruption merely an attack and defense then we shall remain for a shorter time than when we include a march with combat in engagement, attack, pursuit, and the like. In any case, after the exercise the units should be given at least one full day's rest in the place where they have been quartered up to that time.

#### Analysis

After the completion of the mobile encampment it is necessary to make an analysis of the work, and this should be done not only with respect to the success of training but also for quartering, feeding, and methods of carrying out [these things] etc. In order that the analysis might be more successful group conferences should be held with the troops so that they themselves might elaborate on their observations and ideas and also make suggestions which can be of value for the organization of future mobile encampments. After the group conferences, conferences should be held with the officers and non-commissioned officers who participated in the mobile encampment. It would be desirable for officers who did not participate in the mobile encampment also to participate in the conferences so that through discussion they might gain knowledge for a future mobile encampment.